




Municipal supply chain performance through information sharing and stakeholder collaboration



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Background: The effectiveness of information sharing between municipalities and their stakeholders remains an important area for consideration in the improvement of supply chain performance.

Aim: This article responds to municipal service delivery challenges in South Africa by testing a model for improving supply chain performance (SCP) through information sharing (IS) and stakeholder collaboration in municipalities.

Setting: The setting includes two metropolitan municipalities in the Eastern Cape Province of South Africa.

Method: The study employed a cross-sectional survey involving 370 supply chain role players. Hypothesised relationships were tested using structural equation modelling.

Results: The results revealed that information sharing is positively associated with stakeholder trust, governance and administration and stakeholder relationship continuity. Stakeholder trust, governance and administration, and stakeholder relationship continuity are positively related to the fluency of stakeholder collaboration. Full mediation between the constructs was observed for all relationships tested in the study.

Conclusion: The article demonstrates the application of information sharing through, stakeholder trust, governance and administration, and stakeholder relationship continuity in predicting supply chain performance in South African municipalities. The overall outcome of the study is that information sharing and stakeholder relationships are essential drivers of municipal supply chain performance.

Contribution: The study contributes to supply chain management literature by providing insights into how municipalities can utilise information to improve stakeholder relationships and enhance service delivery performance. This study could unlock some keys to overcoming municipal service delivery challenges in South Africa.

Keywords: information sharing; stakeholder trust; governance and administration; stakeholder relationship continuity; supply chain performance.

Introduction

Background

Municipalities in South Africa are expected to develop and implement supply chain management (SCM) systems equitably, transparently, competitively and cost-effectively as prescribed by the Constitution (Mpofu & Hlatywayo 2020; Zweni, Yan & Uys 2022). Supply chain management may be perceived as handling the whole production process of products to maximise customer experience, quality delivery and profitability (Hugo, Badenhorst-Weiss & Van Biljon 2021). It facilitates the smooth flow of products, money and information, from the procurement of raw materials to the delivery of the final product to the customers or markets (Qrunfleh & Tarafdar 2014). However, the public sector SCM system in South Africa is complex because it involves numerous factors such as several relevant pieces of legislation, numerous stakeholders, different SCM standards, its applicability to public sector organisations that perform various roles, e.g., government departments, state-owned enterprises and municipalities and the scarcity of SCM skills in the country, among others (Ambe & Badenhorst-Weiss 2020; Van der Waldt & Fourie 2022). This complexity hampers service delivery, thereby contributing adversely to meeting the needs and requirements of various stakeholders.

As a result, the performance of municipalities could have been better in meeting the service delivery demands of stakeholders (Zweni et al. 2022). An ineffective and inefficient public SCM system has been blamed for most of the service delivery challenges facing South African municipalities (Enwereji & Uwizeyimana 2019). Hugo et al. (2021) mentioned that corruption has taken precedence over the laid-down standards of the SCM system. These high levels of corruption result from the complexity of the SCM system. Most of the contracts for municipal projects are awarded without following the legislated procedures (Ambe & Badenhorst-Weiss 2020). Supply chain systems in most of the municipalities in South Africa are run by unqualified personnel and elected officers who award tenders to their political comrades (Ambe 2019). Corruption, partisanship and a lack of qualified personnel in municipality structures make the SCM system complex and ineffective (Van der Waldt & Fourie 2022). The municipal service areas most affected by ineffective SCM include access to land, clean water, ablution facilities, electricity and roads (Jen et al. 2020). Access to land in South African municipalities is crucial (Zweni et al. 2022).

However, many officers who manage municipalities in South Africa are elected, and most need to gain the fundamental skills required to run these municipalities successfully (Enwereji & Uwizeyimana 2019). These elected officers often promote their political party agendas at the expense of existing service delivery mandates. For instance, corrupt municipal officers tend to withhold information on how qualified stakeholders can access land and other resources such as minerals and plantations. This keeps these vital resources away from the intended beneficiaries and affects the smooth running of municipal supply chains (Van der Waldt & Fourie 2022). As a result, many communities in South Africa have resorted to using public protests to highlight their dissatisfaction with municipal service delivery (Mpfu & Hlatywayo 2020). This has placed the government under pressure to address the challenges facing municipalities to prevent the violence, destruction of property and adverse reputational effects of these protests.

Information sharing (IS) among the relevant stakeholders is essential for improving supply chain performance within the private sector (Jen et al. 2020). A study by Qrunfleh and Tarafdar (2014) shows that SCM information sharing can have the same outcomes regardless of the type of organisation, industry or economic sector. Within South African municipalities, an effective information-sharing system can stimulate supply chain performance by reducing supply chain costs and improving supply chain agility and responsiveness (Hugo et al. 2021). Furthermore, IS among municipal stakeholders is linked to improved service quality (Mpfu & Hlatywayo 2020). It also enables supply chain partners to work cooperatively to achieve mutual goals (Anin et al. 2022). An example would be the joint acquisition and sharing of expertise and resources (Balaeva et al. 2021).

After all, SCM depends on relationships, interaction and networking (Jen et al. 2020). Despite this established importance of IS between supply chain partners, the effectiveness of the information exchanges between municipalities and their stakeholders remains an essential area for consideration and requires attention. In the case of South African municipalities, one of the keys to unlocking superior performance lies in the power of stakeholder relationships, which can be modelled to ensure that SCM imperatives are met successfully.

Public SCM in South African municipalities has numerous challenges (Biljohn & Lues 2020). Within this country, public SCM is mostly aimed to promote good governance principles and present a preferential procurement system (Van der Waldt & Fourie 2022). Preferential procurement is a concept in which certain groups of suppliers are given priority consideration for the awarding of contracts (Sibanda & Tshikovihi 2022). In South Africa, suppliers who fall within designated groups have priority in awarding government contracts (Mashilo & Kgohe 2021). However, preferential procurement, as dictated by the Preferential Procurement Act, has yet to be fully accomplished. The public sector SCM system is exceedingly decentralised, which permits managers employed within government organisations to control it. This has, nevertheless, made the process disjointed, making it challenging for the government and its departments to attain maximum value in the buying and usage of products (Jen et al. 2020).

The decentralisation of the SCM in the public sector has brought about unscrupulous activities such as bribery, fraud and rampant corruption in most government departments of South Africa. A study by Van der Waldt and Fourie (2022) reports numerous SCM-related problems within the public sector. These included the lack of expertise to manage the SCM system, ineffective demand planning, the absence of monitoring and evaluation processes, unethical behaviour, non-compliance with rules and regulations and the overall ineffectiveness of black empowerment programmes. Because of the fact that the public SCM spend is projected to reach a substantial amount of more than one trillion rands (Statistics South Africa 2021), there is a requirement to address these challenges to allow the South African government in fulfilling its socio-economic mandates.

This study examines the role of IS in improving supply chain performance in South Africa's municipalities, considering the mediating role of stakeholder collaboration. Municipal supply chains in South Africa face numerous challenges, culminating in underperformance in service delivery, prompting further empirical studies to generate information to resolve such problems and find lasting solutions. Moreover, the limitations of the available literature on municipal SCM within South Africa also add to the impetus to conduct such studies to create new knowledge in this area. For instance, several studies on South African municipalities have been undertaken before (e.g. Mamokhere 2023; Magagula et al. 2022; Munzhedzi 2021; Van der Waldt, Fourie

& Malan 2024). However, the relationships between IS, stakeholder collaboration and municipal supply chain performance in South Africa remain untested, which presents a significant research gap that must be addressed. Therefore, this study aims to fill this research gap and generate new information about how IS may stimulate better stakeholder relationships and municipal supply chain performance in South Africa. The article focuses on municipal supply chains in South Africa, which deal with a municipality's multiple suppliers, the municipality itself and its customers (the people in its constituency).

Literature review

Research theory

The study is based on the social capital theory. This theory states that a network of relationships leads to gain in resources, and these gains are otherwise not possible in the absence of those relationships (Adler & Kwon 2002). Social capital refers to features of social organisations that facilitate coordination and cooperation for mutual or individual benefit (Coleman 1990). Relationships can be structural (networks, structure of networks, ties); cognitive (reciprocity, norms and values, shared culture, trust) and relational (interactions, trust, social relations, bonds, ties). In such relationships, collective interests override individual interests and gains in resources are dependent on the type of relationships (Rainie & Wellman 2012). In the context of this study, greater gains could be realised in cases where collaborative relationships exist between a municipality and its stakeholders.

Background of supply chain management in the South African municipalities

Supply chain management was adopted in post-apartheid South Africa as a strategic technique to manage procurement activities (Van der Waldt & Fourie 2022). The system operated under a centralised system of procurement. With the adoption of SCM, an implementation plan was developed, and an appropriate legislative framework was established. Municipalities in South Africa had to customise the broad SCM policy to suit their contexts and requirements (Hugo et al. 2021). However, the intended results of adopting SCM have not been fully realised in municipalities because of the high corruption, bribery and fraud (Puspita & Gultom 2022). While IS and SCM in a few municipalities have improved, NMBM and BCMM remain clear cases of supply chain failure and a lack of IS. According to the Auditor General Reports (2022), only 6% and 11% of municipalities in 2020 and 2021, respectively, had clean audit results. In 2021, both NMBM and BCMM had qualified audit results. The SCM success in these two municipalities is hampered by a lack of supply chain skills, IS, basic controls and poor policy compliance, leading to irregular expenditures.

Information sharing

Information sharing is two-way communication between parties involved in collaboration (Hugo et al. 2021). For IS to

be effective, it must happen in real time to decrease uncertainty between supply chain members and support smooth integration (Van der Waldt & Fourie 2022). Information sharing is essential for developing supply chain partners and a significant SCP driver (Ambe 2019). It advances the quality of information in organisational processes and drives process management by communicating strategic goals, objectives and managerial roles (Liu et al. 2015). This reduces supply chain costs, improves performance and builds ST and commitment (Ambe 2019).

Stakeholder trust

Trust is critical for developing partnerships and exchanging information in the SCM system. Fu et al. (2016) suggest that trust promotes IS and reduces the time spent by supply chain partners in negotiations and developing contracts. Furthermore, trust may also reduce the need for buyers to monitor supplier deliveries and the quality of inputs and the necessity to enforce penalties in the case of lower-quality inputs (Ambe & Badenhorst-Weiss 2020). Hence, when trust exists, IS is enhanced, which enables collaborative behaviour and effective SCM (Ambe 2019). Thus, the aggregated level of trust and control determines an organisation's confidence in IS and cooperation in organisations. Stakeholder trust (ST) is the confidence parties have in each other's reliability and integrity (Ambe & Badenhorst-Weiss 2020). To build trusting relationships, time and energy must be devoted to securing a successful long-term exchange through communication, information and innovation sharing between stakeholders (Francisco et al. 2019). Where ST exists, partners may realise various benefits in a supply chain, such as reduced governance costs, more satisfying relationships, improved business performance, reduced conflict between partners and enhanced cooperation (Ambe & Badenhorst-Weiss 2020).

Stakeholder relationship continuity

Stakeholder relationships are professional connections businesses form with people or groups interested in their activities and decisions (Kam & Lai 2018). Some examples of stakeholders are management, employees, investors, communities, customers or clients and suppliers, who all want the organisations to succeed. Relationships between stakeholders are essential in any supply chain because they determine the quality and quantity of exchanges between organisations (Francisco et al. 2019). Stakeholder relationship continuity measures the lifespan of the shared relationship between stakeholders in any supply chain (Hugo et al. 2021). The longer the relationship between stakeholders, the greater the continuity of the supply chain relationship (Kam & Lai 2018). Establishing long-term partnerships indicates that stakeholders, being supply chain parties, have developed mutual trust and are aiming to gain mutual benefits from their relationships (Ambe 2019). Thus, stakeholders who trust each other will likely be more satisfied with their relationships and will direct more effort towards building long-lasting relationships within the supply chain (Kam & Lai 2018).

Governance and administration

Governance and administration (GA) are ethical and practical leadership practices that focus on organisational direction and strategic purpose. The practices involve sets of control measures, leadership quality, integrity, trust and honesty adopted by an organisation (Anin et al. 2022). It responds to the business environment, opportunities and threats in business relationships. The outcomes of GA include but are not limited to legitimacy, satisfactory performance, ethical culture, monitoring and effective control. Governance and administration is critical to an organisation's efficiency and effectiveness and is essential to growth, development and organisational performance (Ambe 2019). Governance is not restricted to the private sector but is also significant for the public sector, including municipalities. Unethical conduct in the public sector negatively affects service delivery beneficiaries and impacts ratepayers and other stakeholders (Kamal et al. 2015). Administration is a normative concept that describes the excellent quality and proper management of processes, systems and human capital in various types of organisations (Klusáček et al. 2018). Hence, good administration can also be applied to managing public sector organisations. In addition, supply chain and organisational performance are influenced by GA systems within the organisation (Hugo et al. 2021).

Collaboration fluency

Collaboration pertains to two or more organisations that work together to pursue a common goal and strengthen their capabilities (Ralston, Richey & Grawe 2017). Stakeholder collaboration fluency (SCF) relates to the proficiency and ability required to work cooperatively with the organisation's strategic constituencies (Grudinschi, Sintonen & Hallikas 2014). In SCM, collaboration fluency aims to improve the performance of the supply chain and gain sustainable competitive advantages (Chakraborty, Bhattacharya & Dobrzykowski 2018). This is attained through joint decision-making and problem-solving, the sharing of information and the sharing of benefits resulting from meeting the needs of customers (Roberts, Van Wyk & Dhanpat 2017). Collaboration fluency can also enhance efficiency, service delivery and product innovation (Roberts et al. 2017). Collaboration fluency enhances the organisation's bottom line, contributing to overall financial performance (Liao, Hu & Ding 2017). However, to achieve this, the culture of collaboration fluency should facilitate mutual respect and involve the willingness to use and develop ideas from supply chain partners rather than directing efforts to perform with each other (Roberts et al. 2017).

Supply chain performance

Supply chain performance (SCP) involves supplying the correct product at the right place, at the correct time, in the proper condition and packaging, in the correct quantities, with the appropriate documentation, to the valid customer (Anand & Grover 2021). Li et al. (2016) reiterate that SCP is measured in delivery, reliability, responsiveness, flexibility,

cost and efficiency. Whitten, Green and Zebst (2022) argue that organisational success in the modern world depends on their effectiveness in managing supply chains. If organisations successfully manage their supply chains, their performance will exceed their competitors (Anand & Grover 2021). Therefore, there is an essential connection between SCP and organisational performance (Qrunfleh & Tarafdar 2014).

Research model and hypotheses development

The study's research model (Figure 1) consists of variables: IS, ST, governance and SRC, followed by the mediator, SCF and the outcome variable, SCP. This section provides the development of the hypotheses of this study.

Information sharing and stakeholder trust

The effects of IS on stakeholders' trust have been investigated for a long time (Ergun et al. 2022). A study by Baah et al. (2022) concluded that IS between stakeholders influences individuals' judgement and trust about the effectiveness of interactions in decision-making. Another study by Ergun et al. (2022) found that IS provides stakeholders' rights to meaningful participation, trust and representation in decision-making processes. In a previous study by Linton (2019), it was observed that trust encourages partners to be more engaged and willing to enter strategic partnerships that usually yield good outcomes. Furthermore, as found in a study by Khan and Vijayashree (2022), commitment is an effective construct that leads to supply chains' ability to collaborate and exchange information, as devoted supply chain members usually spare much of their time, knowledge and expertise to achieve their common goal. Lastly, the same study reveals that reliability and honesty are key elements that contribute hugely to the decision of municipalities to share information, leading to better and more effective SCP. This implies that reliability and honesty may trigger a positive collaborative relationship, highlighted by the common sharing of information. The above discussion leads to the first hypothesis of this study, which specifies that:

H₁: Information sharing is positively associated with stakeholder trust.

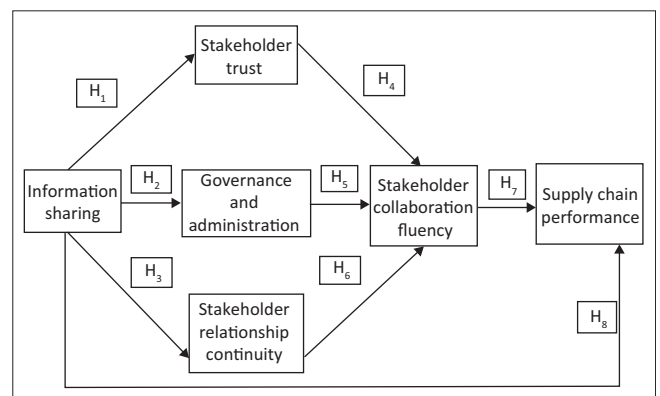


FIGURE 1: Research model for the role of information sharing in improving municipal supply chain performance, with the mediating role of stakeholder collaboration.

Information sharing governance and administration

Various studies express principles of good governance in different contexts (Ambe 2019; Ardyan & Sugiyanti 2018; Hugo et al. 2021). Some contextualise these principles around development and others from the human rights viewpoint. For instance, the United Nations Development Programme (UNDP) and the World Bank put good governance about development. Klusáček et al. (2018) noticed that its concept has several fundamental characteristics: accountability, transparency, responsiveness, equitability and inclusiveness, effectiveness and efficiency, the rule of law, participation and consensus building. A study by Qrunfleh and Tarafdar (2014) established a positive correlation between IS and governance. Eckerd and Sweeney (2018) have shown that IS assists organisations in enhancing their governance performance. Furthermore, Xu and He (2022) reveal that sharing information is vital for production and logistics administration and relationship management. In addition, Ardyan and Sugiyanti (2018) found that sharing the right and updated information enables organisations to achieve competitiveness and develop capabilities to achieve administration sustainability. This leads to the following hypothesis:

H₂: Information sharing is positively associated with governance and administration.

Information sharing and stakeholder relationship continuity

In the modern age of procurement, the supply chain is becoming increasingly complex, with multiple stakeholders being utilised by one organisation to produce their products. With the increasing pressure on the supply chain to keep the cost for the customer down, it is increasingly difficult to maintain healthy relationships (Zhang & Cao 2018). As indicated in a previous study by Chen et al. (2017), achieving stakeholder relationships in the supply chain processes requires the sharing of information, the latter of which should be accurate, trustworthy, timely, useful and readily useable. Zhang and Cao (2018) established that IS in the supply chain network enhances relationships among supply chain partners or stakeholders. These insights lead to the following hypothesis:

H₃: Information sharing is positively associated with stakeholder relationship continuity.

Stakeholder trust and stakeholder collaboration fluency

Stakeholder trust is crucial in SCF because organisations are functions of relationships with diverse stakeholders (Swift, Guide & Muthulingam 2019). This implies that revealing information to stakeholders contributes to building trust and loyalty with stakeholders. A study by Wamba (2018) found that collaboration fluency is successful based on ST. Dubey et al. (2020) observed that trust is necessary for collaboration fluency to be achieved in organisations. Specifically, nurturing

ST improves supply chain collaborations while bolstering stakeholder satisfaction and loyalty (Wamba 2018). In addition, as concluded in a study by Ralston et al. (2017), the relationships between ST and collaboration fluency ensure supply chain effectiveness. Moreover, understanding ST might be the next source of competitive advantage and collaboration fluency (Dubey et al. 2020). Based on the given insights, it is hypothesised that:

H₄: Stakeholder trust is positively associated with stakeholder collaboration fluency.

H₅: Improved governance and administration are positively associated with stakeholder collaboration fluency.

H₆: Stakeholder relationship continuity is positively associated with stakeholder collaboration fluency.

Stakeholder collaboration fluency and supply chain performance

In a study by Swift et al. (2019), it was found that the benefits of SCF include reducing supply chain costs, such as those associated with inter-organisation transactions and inventory and production. The SCF further leads to improved logistics performance, risk mitigation and reductions in gaming and rationing in the supply chain, one of the leading causes of the bullwhip effect (demand amplification) (Swift et al. 2019). Hence, SCF can eliminate the bullwhip effect, and if collaboration is successful, it could lead to more collaborative actions (Ramanathan & Gunasekaran 2022). Chen et al. (2017) found that collaboration fluency enables agility and supply chain visibility, which are the routes to improving supply chain performance. Zhang and Cao (2018) observed that collaboration fluency among supply chain partners enables flexibility, enhancing supply chain performance. According to a study by Dubey et al. (2020), collaboration fluency among stakeholders leads to superior supply chain performance. The aforesaid discussion, thus, leads to the following hypothesis:

H₇: Stakeholder collaboration fluency is positively associated with supply chain performance.

Information sharing and supply chain performance

Information sharing is the key to improving the overall competitiveness of the supply chain and enhancing the performance of the whole supply chain. Various studies have established a positive relationship between IS and supply chain performance in different organisations (Ardyan & Sugiyanti 2018; Purwanto, Siagian & Yuliana 2021; Ramanathan & Gunasekaran 2022). Furthermore, Xu and He's (2022) study reveals that sharing information is essential for production and logistics administration and supply chain agility. A study by Ardyan and Sugiyanti (2018) concluded that the sharing of right and updated information enables organisations to achieve competitiveness and develops capabilities to achieve performance in responsiveness and meeting customer demands. However, Ramanathan and Gunasekaran (2022) argue that IS should be coupled with other factors such as lean procurement, efficiency and reverse

logistics to realise the whole package of supply chain performance. This leads to the following hypothesis:

H_8 : Information sharing has a positive influence on supply chain performance.

Methods

This study followed the quantitative approach using the cross-sectional survey method because it sought to investigate the relationships between different constructs by assessing the views of targeted respondents (Creswell 2018). Likewise, the survey method enables a more convenient once-off collection of data and an adequate statistical-oriented analysis of gathered information (Okoumba, Mafini & Bhadury 2020).

Target population, sample size and sampling technique

The Eastern Cape province has two metropolitan municipalities: Buffalo City Metropolitan Municipality (BCMM) and Nelson Mandela Bay Municipality (NMBM). These two metropolitan municipalities were chosen for this study as they are large in geographic area, the number of employees and their large SCM systems and processes. Furthermore, the two municipalities have a well-developed economic base, with the auto industry playing a major role. The target population of this study consisted of supply chain role players who were employees directly and indirectly involved in the SCM function within these two metropolitan municipalities. These supply chain role players included all key SCM stakeholders, end-users, municipal managers, executive directors, senior managers, supply chain bid committee members, secretariat staff, financial management staff or accountants, employees with purchasing authority and project managers and all SCM practitioners. The number of SCM role players who were the targeted population at the time of the survey stood at 315 in the BCMM and 582 at the NMBM. A probability-based cluster sampling technique was applied. The two municipalities were sampled separately, and respondents were randomly drawn from either group, using a correct and complete list of their names. Using a cluster random technique reduced sampling bias by ensuring that respondents from either municipality were adequately represented in this study. From the initial 500 questionnaires distributed to respondents, 118 were not returned, and 12 were discarded because they were unusable, incomplete or had errors. The final sample size of 370 respondents represented a response rate of 74%. This response rate is considered 'acceptable' by Creswell (2018).

Measurement scales

Measurement scales used in this study were adapted from previously validated scales (refer to Appendix 1). Nine questions adapted from Chen et al. (2017) were used to measure IS. The questions focused on integrating information systems and applications in the municipality and supply chain and how such systems link with various supply chain partners. An eight-item scale adapted from Swift et al. (2019) was used to

measure ST. The questions elicited information on the reliability, capabilities, ethics, reputation and willingness to cooperate among the municipality's stakeholders. A five-item scale adapted from Grudinschi et al. (2014) was utilised to measure GA. The questions focused on understanding roles and responsibilities, joint problem-solving and the effectiveness of coordination and collaboration efforts with stakeholders. The SRC was measured using a seven-item scale derived from Chen et al. (2017), emphasising the potential for a long-term alliance relationship, mutual support in areas such as quality and finance and the level of commitment. A seven-item scale adapted from Swift et al. (2019) measured SCF, concentrating on creating processes and systems and providing resources for facilitating the smooth relationship between the municipality and its stakeholders. An eight-item scale from Li et al. (2016) and Qrunfleh and Tarafdar (2014) was adapted to measure the SCP construct. The measures centred on the municipal supply chain's capacity to meet the expected standards in areas such as client needs, service delivery, response time, volumes of services or products provided and information systems integration. The measurement scales used in the study had all been validated, having attained Cronbach's alpha values higher than the prescribed minimum of 0.7 (Cronbach 1951). All response options were presented on a five-point Likert-type scale anchored by 1 = strongly disagree to 5 = strongly agree to express the degree of agreement (Okoumba et al. 2020).

Common methods variance

Measurement scales were adapted from different sources and previous studies to minimise common methods' variance. In addition, data were collected using two different methods, yielding a response rate of 74%. Of this response rate, 51% was for email surveys, while 23% was for the drop-and-collect method. The questionnaire was also designed carefully by avoiding double-barreled questions and any overlapping questions that measured different constructs and keeping the questions concise and specific. Harman's one-factor test was run using factor analysis on the entire data set. The test yielded one factor contributing to 37% of the variance, indicating that common methods bias was limited.

Data analysis

The analysis of the data included descriptive and inferential statistics. Descriptive statistics in the form of frequencies, percentages, mean scores and standard deviations were computed using the Statistical Packages for the Social Sciences (SPSS version 27.0). Inferential statistics were analysed using structural equation modelling (SEM). This included confirmatory factor analysis, performed using the Analysis of Moment Structures (AMOS version 27.0) statistical software. Hypotheses were tested using SMART partial least squares (PLS version 4.0).

Ethical considerations

Ethical clearance to conduct the study was obtained from the Central Research Ethics Committee at a South African

University of South Africa. The study conformed to ethical standards regarding the minimal risk it posed and the voluntary participation and protection of respondents' identities. It was further supported by providing an ethical clearance certificate conferred by the university (Ref: # 2019_SBL_DBL_018_FA).

Results

Sample profile

The demographic profile of the respondents is indicated in Table 1.

Males constituted most respondents (58.9%; $n = 218$). Concerning the age distribution, most respondents were between 35 and 40 (35.4%; $n = 131$). Moreover, 74.9% ($n = 277$) of the respondents were identified as black. Most respondents, 54.1.8% ($n = 200$), were holders of degree qualifications. Regarding the respondents' experience, most (51.1%; $n = 189$) were employed between 5 and 10 years. Furthermore, 62.7% ($n = 232$) of the respondents were permanently employed, and most were employed in the supply chain department (78.1%; $n = 289$).

TABLE 1: Respondents' characteristics.

Variable	Category	Frequency	%
Gender distribution	Male	218	58.9
	Female	152	41.1
	Total	370	100.0
Age group (years)	25 and below	18	4.9
	26 to 34	84	22.7
	35 to 40	131	35.4
	41 to 49	87	23.5
	50+	50	13.5
	Total	370	100.0
Level of education	Matric	15	4.1
	Certificate	56	15.1
	Diploma	63	17.0
	Degree	200	54.1
	Postgraduate	36	9.7
	Total	370	100.0
Race distribution	Black people	277	74.9
	White people	42	11.4
	Indian people	32	8.6
	Mixed race people	19	5.1
	Total	370	100.0
Work experience (years)	0–5	47	12.7
	6–10	189	51.1
	11–15	89	24.1
	15+	45	12.1
	Total	370	100.0
Department	Human resources	9	2.4
	operations	43	11.6
	Supply chain management	289	78.1
	Accounting and finance	15	4.1
	Information technology (IT)	14	3.8
	Total	370	100.0
Type of employment	Permanent	232	62.7
	Contract	113	30.5
	Internship	25	6.8
	Total	370	100.0

Scale accuracy analysis

Structural equation modelling (SEM) involves two sequential procedures. The first one is confirmatory factor analysis (CFA), which is used to verify the number of underlying dimensions of the instrument and the pattern of item-factor relationships. This is followed by the path analysis procedure for testing the proposed hypotheses. In applying the CFA, the study verified the number of underlying dimensions of the instrument and the pattern of item-factor relationships by testing for internal consistency, reliability, validity and model fit. The results are presented in Table 2.

Reliability and validity

All measurement scales yielded Cronbach's alpha values above the 0.7 minimum threshold, confirming the reliability criteria satisfaction (Taber 2018). Item-to-total correlations for all scales were higher than the recommended 0.3 minimum cut-off value (Taber 2018), while composite reliabilities (CRs) for all scales also surpassed the prescribed 0.7 minimum limit, further indicating that all measurement scales were internally consistent. Face and content validity were tested through the questionnaire review by a panel of academics. After reviewing the research instrument, the reviewers proffered recommendations in terms of wording, the grammar of questions and the technical layout of the questionnaire. Additionally, a pilot study assessed the ease with which respondents could use the questionnaire. A total of 60 questionnaires were distributed to the respondents. Of these, 53 questionnaires were returned, eight of which were discarded because of missing data. The selection criteria were based on the knowledge and experience in SCM.

From the pilot sample, the respondents were comfortable with the questions and completed the responses within 15 min. Factor loadings derived from the CFA and the average variance extracted (AVE) were used to ascertain convergent validity. All factor loadings related to the items retained in measuring each construct were higher than 0.5, suggesting that every accepted item met the criteria for convergent validity and counted at least 50 per cent of what they intended to measure (Cheah et al. 2020). The AVE values for constructs were greater than the required threshold of 0.4, which again supports the accepted degree of convergent validity (Cheah et al. 2020). To test for discriminant validity, the recommendation by Bagozzi and Yi (1988) that correlations between paired constructs must be less than 1.0 was followed. As indicated in Table 3, this rule was satisfied, indicating that discriminant validity was adequate in the study.

Model fit analysis

To ascertain the fitness of a research model for both the CFA and structural models, indicators such as the chi-square value over degrees of freedom (χ^2/df); root means square

TABLE 2: Accuracy analysis statistics.

Research constructs	Descriptive statistics		Cronbach's test		AVE	Factor loadings
	Mean	SD	Item-total	Alpha value		
IS1	4.15	1.734	0.800	0.937	0.934	0.843
IS2	-	-	0.790	-	-	0.834
IS3	-	-	0.771	-	-	0.806
IS4	-	-	0.752	-	-	0.791
IS5	-	-	0.824	-	-	0.865
IS6	-	-	0.782	-	-	0.837
IS7	-	-	0.739	-	-	0.806
IS8	-	-	0.706	-	-	0.783
IS9	-	-	0.689	-	-	0.772
ST1	4.68	1.462	0.706	0.896	0.894	0.814
ST2	-	-	0.775	-	-	0.858
ST3	-	-	0.801	-	-	0.871
ST4	-	-	0.685	-	-	0.778
ST6	-	-	0.723	-	-	0.821
ST7	-	-	0.713	-	-	0.793
GA2	5.05	1.363	0.714	0.852	0.889	0.850
GA3	-	-	0.772	-	-	0.880
GA4	-	-	0.754	-	-	0.859
GA5	-	-	0.718	-	-	0.615
SRC2	4.85	1.462	0.722	0.878	0.880	0.798
SRC3	-	-	0.652	-	-	0.730
SRC5	-	-	0.594	-	-	0.851
SRC6	-	-	0.730	-	-	0.807
SRC7	-	-	0.689	-	-	0.865
SCF2	4.81	1.473	0.598	0.877	0.848	0.702
SCF3	-	-	0.653	-	-	0.756
SCF4	-	-	0.673	-	-	0.808
SCF5	-	-	0.749	-	-	0.836
SCF6	-	-	0.794	-	-	0.872
SCF7	-	-	-	-	-	0.724
SCP2	4.43	1.680	0.613	0.934	0.936	0.858
SCP3	-	-	0.836	-	-	0.864
SCP4	-	-	0.827	-	-	0.869
SCP5	-	-	0.823	-	-	0.885
SCP6	-	-	0.843	-	-	0.846
SCP7	-	-	0.766	-	-	0.821
SCP8	-	-	0.741	-	-	0.832

AVE, average variance extracted; IS, Information sharing; ST, Stakeholder trust; GA, Governance and administration; SRC, Stakeholder relationship continuity; SCF, Stakeholder collaboration fluency; SCP, Supply chain performance.

error of approximation (RMSEA), Tucker-Lewis Index (TLI), comparative fit index (CFI), the goodness of fit index (GFI) and the incremental fit index (IFI) were used. Chi-square values over the degree of freedom (χ^2/df) for both the CFA and the structural models were within the required threshold of ≤ 5 as suggested by Wheaton et al. (1977). Moreover, the RMSEA values also fell within the recommended bracket of ≤ 0.08 (Browne & Cudeck 1993). Other indices, such as CFI, IFI, and TLI, were acceptably above the 0.9 cut-off limit, as suggested by Cheah et al. (2020). Hence, the model fit for both the CFA and the structural model was considered acceptable and the model was retained.

Path analysis results

Path analysis was used to analyse the eight hypotheses and establish their validation or non-validation based on the results using partial least squares SEM. This analysis was

conducted using SMART PLS (version 4.0). Several items with outer loadings less than the recommended minimum 0.7 (Cheah et al. 2020) were discarded. These were items ST5, ST8, GA1, SRC1, SRC4, SCF1 and SCP1. The results of the path analysis are presented in the structural model in Figure 2.

The structural path model shows the latent variables (IS, ST, GA, SRC, SCF, SCP), their associated observed variables and error terms. The highest path coefficient is between IS and ST ($\beta = 0.59$). The factor loadings are the figures slotted in the arrows between the latent and observed variables.

Hypothesis test results

The hypotheses test results, based on SEM, are reported in Table 4.

Discussions of results

The results revealed that information sharing is positively associated with ST in municipalities. The relationship resulted in a path coefficient of $\beta = 0.531$, $t = 12.751$, $p = 0.000$, demonstrating the importance of IS in ensuring increased ST between municipalities and their stakeholders. Correspondingly, Mofokeng and Chinomona (2019) argue that effective information exchange between organisations and their partners positively influences scheduling flexibility and rapid responsiveness and increases mutual trust. In addition, Zhixiang (2020) concluded that the relationship in supply chains is characterised by trust and information sharing. Again, Linton (2019) suggests that information sharing adds value in ensuring coordination and trust between stakeholders and parent organisations. Similarly, Squire, Cousins and Brown (2019) highlighted that information sharing between supply chain partners improves the coordination of activities. Likewise, Zhixiang (2020) established that information sharing reduces uncertainties and improves the inter-organisational links between supply chain partners, empowering them with essential information. Therefore, municipalities should improve their information-sharing capabilities to enhance trust with their stakeholders and increase harmony between them.

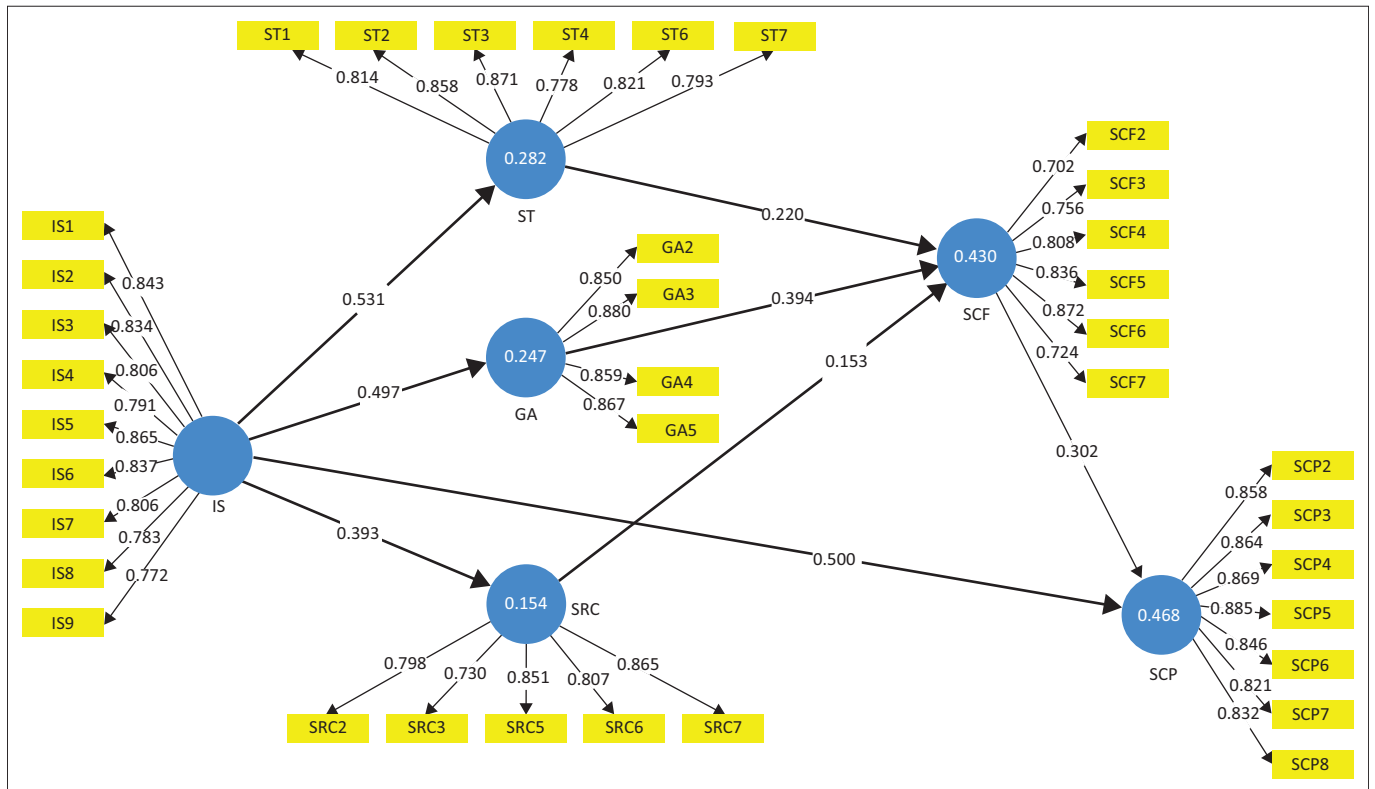
The study also revealed that information sharing is positively associated with GA, with a path coefficient of $\beta = 0.497$; $t = 11.495$; $p = 0.000$. The results imply that IS plays a critical role in the effectiveness and efficiency of administration in municipalities. Similarly, Jen et al. (2020) submitted that sharing information in supply chains remains an indistinct and vital function as it feeds into trust and risk-sharing contracting, which represents some corporate GA mechanisms. Pauraj (2008) concurs that effective information exchange between organisations and their partners positively impacts volume and scheduling flexibility, rapid responsiveness and increases mutual trust. Therefore, IS plays a critical role in the effectiveness and efficiency of GA in municipalities. This could unlock one of the keys to overcoming municipal service delivery challenges in South Africa.

TABLE 3: Discriminant validity.

Research construct	IS	ST	GA	SRC	SCF	SCP
IS	1.000	-	-	-	-	-
ST	0.556	1.000	-	-	-	-
GA	0.518	0.652	1.000	-	-	-
SRC	0.423	0.561	0.592	1.000	-	-
SCF	0.453	0.565	0.672	0.533	1.000	-
SCP	0.627	0.511	0.537	0.486	0.553	1.000

Note: Correlation is significant at the 0.001 level (three tailed).

IS, information sharing; ST, stakeholder trust; GA, governance and administration; SRC, stakeholder relationship continuity; SCF, stakeholder collaboration fluency; SCP, supply chain performance.



IS, information sharing; ST, stakeholder trust; GA, governance and administration; SRC, stakeholder relationship continuity; SCF, stakeholder collaboration fluency; SCP, supply chain performance.

FIGURE 2: Structural path model.

Another exciting result shows that information sharing is positively associated with SRC ($\beta = 0.393; t = 8.779; p = 0.000$). This result implies that IS in municipalities is vital for improving partner relationships. Correspondingly, Hsu et al. (2018) concluded that IS contributes to improved relationships with supply chain partners by facilitating coordination, responsiveness and the integration of partners. This helps to build effective long-term relationships with key groups. Furthermore, Saqib, Saqib and Ou (2019) establish that IS with stakeholders creates a positive understanding that helps build effective long-term relationships with key groups. In the same vein, Jen et al. (2020) state that exchanging information between organisations and their stakeholders creates an open environment that allows partners to be honest and free to express their concerns, which builds trust and strong relationships.

The results also revealed that ST is positively associated with SCF ($\beta = 0.220; t = 3.281; p = 0.000$). Hsu et al. (2018) revealed that ST is an essential contributor to SCF, and it inspires

confidence in supply chain partners, which enables them to collaborate. Likewise, a study by Zhixiang (2020) concluded that ST is critical to achieving long-term collaborative relationships and competitiveness. Moreover, Saqib et al. (2019) found that an initial level of trust enables the supply chain partners to engage and an even higher level of trust provides parties with confidence and understanding of their partnership responsibilities. Thus, it may be regarded that ST instils confidence and trust in supply chain partners to collaborate.

The results also revealed that GA positively associates with SCF ($\beta = 0.394; t = 5.548; p = 0.000$). This result implies that collaboration with municipalities' stakeholders depends on the values embedded in GA (Alrubaiee & Al-Nazer 2020). Such values may include transparency, trust, accountability, fairness, and equity, to mention a few. Hsu et al. (2018) posit that how organisations are managed has high implications for collaboration with stakeholders. In addition, Saqib and Ou (2019) stated that how supply chain organisations are

TABLE 4: Hypotheses results.

Path	Hypothesis	Path coefficient (β -value)	T-value	p	Outcome
IS \rightarrow ST	H ₁	0.531	12.751	0.000	Supported and significant
IS \rightarrow GA	H ₂	0.497	11.495	0.000	Supported and significant
IS \rightarrow SRC	H ₃	0.393	8.779	0.000	Supported and significant
ST \rightarrow SCF	H ₄	0.220	3.281	0.000	Supported and significant
GA \rightarrow SCF	H ₅	0.394	5.548	0.000	Supported and significant
SRC \rightarrow SCF	H ₆	0.153	2.336	0.000	Supported and significant
SCF \rightarrow SCP	H ₇	0.302	6.376	0.000	Supported and significant
IS \rightarrow SCP	H ₈	0.500	10.731	0.000	Supported and significant

IS, information sharing; ST, stakeholder trust; GA, governance and administration; SRC, stakeholder relationship continuity; SCF, stakeholder collaboration fluency; SCP, supply chain performance.

Significance level $p < 0.05$; $t > 1.96$. Eight hypotheses were tested in this study. The table shows that all the hypotheses were supported and significant.

administrated has implications for stakeholder collaboration fluency. Therefore, strengthening governance mechanisms in municipalities is essential to ascertain stakeholder involvement and support.

The results established that SRC has a positive association with SCF ($\beta = 0.153$; $t = 2.336$; $p = 0.000$). This result may imply that relationship continuity enables organisations to retain their customers and suppliers. Alrubaiee and Al-Nazer (2020) support that relationship continuity with stakeholders breeds commitment, which is at the core of all long-term relationships, including supplier–buyer relationships. Likewise, Adiguzel, Erdil and Artar (2019) state that solid relationships with stakeholders cultivate commitment, allowing organisations to retain internal and external stakeholders. Similarly, relationship continuity inspires organisations to make quick, informed decisions (Abutabenjeh 2021). As such, relationships between supply chain actors build a mutual connection that creates interdependence, improves communication and increases problem-solving.

Another interesting result revealed that SCF is positively associated with SCP ($\beta = 0.302$; $t = 6.376$; $p = 0.000$). This points to the significance of SCF in ensuring goal congruence between municipalities and their stakeholders, which is a critical factor in ensuring SCP (Abutabenjeh 2021). Also, the results suggest that stakeholder collaboration in municipal activities helps value co-creation. Correspondingly, Mofokeng and Chinomona (2019) confirmed that collaboration among stakeholders allows firms to be synchronised and function cohesively through sharing and pooling resources that provide value and enhance performance.

Regarding the relationship between IS and SCP, the result of the path analysis indicates that IS positively influences SCP ($\beta = 0.500$; $t = 10.731$; $p = 0.000$). This implies that when IS increases in municipalities, SCP, in turn, improves significantly. The study's results suggest that IS leads to

TABLE 5: Mediation results.

Mediated relationship	Beta (β)	T-value	p	Result
GA \rightarrow SCF \rightarrow SCP	0.119	4.006	0.000	Full mediation
IS \rightarrow GA \rightarrow SCF	0.196	4.827	0.000	Full mediation
SRC \rightarrow SCF \rightarrow SCP	0.046	2.056	0.040	Full mediation
ST \rightarrow SCF \rightarrow SCP	0.066	3.063	0.002	Full mediation
IS \rightarrow ST \rightarrow SCF \rightarrow SCP	0.035	2.898	0.004	Full mediation
IS \rightarrow SRC \rightarrow SCF \rightarrow SCP	0.058	1.987	0.002	Full mediation
IS \rightarrow ST \rightarrow SCF	0.117	3.061	0.002	Full mediation
IS \rightarrow SRC \rightarrow SCF	0.060	2.182	0.029	Full mediation
IS \rightarrow GA \rightarrow SCF \rightarrow SCP	0.059	3.621	0.000	Full mediation

IS, information sharing; ST, stakeholder trust; GA, governance and administration; SRC, stakeholder relationship continuity; SCF, stakeholder collaboration fluency; SCP, supply chain performance.

better performance in municipal supply chains. The given result aligns with Linton's (2019) suggestion that IS aims to improve the efficiency and effectiveness of the whole network of organisations and, finally, the firm's performance and operational performance. The results also infer that IS allows firms to coordinate their activities better. It is supported by a view shared by Squire et al. (2019) who observed that the increased availability of information along a supply chain allows firms to better coordinate their activities with their partners, which leads to better performance for both the supply chain as a whole and its constituent firms. Also, the results of the study suggest that sharing information with stakeholders results in cost reduction. In their simulation study, Linton (2020) observed that with more detailed information shared between firms, the result was a higher reduction in total supply chain cost.

Mediation

Mediation, signifying the indirect relationships between the constructs of the study, was also tested using the PLS technique. The results are reported in Table 5.

The results in Table 5 show full mediation among the constructs. The results denote that the mediating constructs increase the impact of the predictors on the outcome constructs. For instance, SCF fully mediated the relationship between GA and SCP ($\beta = 0.119$; $t = 4.006$; $p = 0.000$). This result suggests that SCF enhances the impact of GA on SCP by 11.9%. Similar to this relationship, the rest of the mediators in the study tend to positively magnify the influence of the predictors on the outcome constructs, confirming their importance in improving SCP through sharing information and links with stakeholders in municipalities.

In line with the social capital theory, the study found that municipalities and their stakeholders are integrated by their collective interests and gains that come with working together. The results of the study revealed that SCF exerts an impact on SCP, which is in line with the social capital theory in that the collaborations of municipalities and their stakeholders work together to optimise SCP. In this study, the relationship between stakeholders and municipalities is both structural. They are bound by supply chain networks

they share and relational where they are tied through interactions and base their relations on mutual trust. This is congruent with the social capital theory, which suggests that relationships can be: structural (networks, the structure of networks, ties); cognitive (reciprocity, norm or values, shared culture, trust) and relational (interactions, trust, social relations, bonds, ties).

Conclusion and managerial implications

This study aimed to analyse the relationship between IS, stakeholder relationships and SCP in municipalities in South Africa. The study revealed a significant positive association between IS and stakeholder relationship practices (ST, SRC and GA). A positive and significant association was observed between GA and SCF, which also impacted SCP. Information sharing was also found to be associated with SCP. Therefore, the study validates the positive association of IS with stakeholder relationship practices, GA and municipal SCP. The study contributes to the management in several ways. To address SCM-related and service delivery challenges facing them, management in the selected municipalities should pay attention to enhancing the antecedents of SCP, namely, IS, ST, GA, relationship continuity and collaboration fluency. Improving these factors has the effect of boosting the performance of the municipal SCP, with obvious positive implications for service delivery. Furthermore, management in the selected municipalities may apply information-sharing practices as it is imperative to collaborate and integrate with the parties and stakeholders in a supply chain. Thus, IS can assist municipality management in enhancing supply chain efficiency by reducing waste and costs, thereby improving the supply chain performance. Therefore, supply chain role players, leadership, and management in South African municipalities can take note of and ensure that the five dimensions of SCP are effectively implemented in their organisations for overall service delivery.

The study also demonstrates how IS has emerged as an essential trigger for various activities critical to the optimum performance of the municipal supply chain. The IS with stakeholders is associated with stakeholder relationships and the administrative governance of the municipality, as well as the effectiveness of supply chain efforts. The study encourages supply chain role players to understand the principle of information exchanges with stakeholders, such as suppliers, the constituency, industry in general, higher authorities in government and communities of practice, which is fundamental to fulfilling municipal supply chain goals and objectives. Thus, supply chain role players in South African municipalities need to regularly evaluate the effectiveness of their IS efforts and develop methods to stimulate the exchange of quality information to determine the performance of the whole network. Government authorities may also use this study to establish relevant, progressive policies and regulations for municipal SCM in South Africa. In addition, current public supply chain policies may be reviewed and modified based on this study.

Limitations and suggestions for further research

The study is limited because it was conducted in two metropolitan municipalities in the Eastern Cape province of South Africa. Caution should, therefore, be exercised in generalising the study results to local and district municipalities. The study is further limited by relying on the quantitative method, which has inherent weaknesses because there was no opportunity to interview some respondents. Several suggestions for further research can be made. The study can be expanded to consider other service delivery partners and beneficiaries, including suppliers and communities. Its scope may also be broadened to include local and district municipalities within South Africa.

A mixed-method approach is recommended to integrate qualitative and quantitative views of the SCM role players in future studies. Furthermore, because the study used metropolitan municipalities in only one province, an inter-provincial study involving several municipalities selected from different regions could be conducted, providing a platform for a broader view and understanding of how the same constructs interact in geographically dispersed municipal supply chains. Further similar studies could also test for mediation and consider moderating effects of various demographic factors, such as the number of employees and the size of the municipality's annual budget, on the relationships analysed. It is also acknowledged that the problems experienced in municipal supply chains in South Africa could be linked to other factors such as corruption, cadre deployment, the lack of skills and low revenue from some residents who still refuse to pay the rates to municipalities. Future studies can, therefore, be directed to examining the impact of such factors on SCM.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

C.N. and I.L. are the researcher who led the design and conception, collection of data and manuscript writeup. C.M. is the senior researcher who substantially contributed to data analysis, interpretation of results, conception and design of the study and provided guidance in the manuscript writeup.

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Data availability

The data that support the findings of this study are not openly available because of confidentiality and are available from the corresponding author, I.L. upon reasonable request

Disclaimer

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Appendix 1

List of measurement scales

Information sharing

Information systems are highly integrated throughout the supply chain.

Information applications are highly integrated within the organisation.

Adequate information systems linkages exist with customers.

Adequate information systems linkages exist with suppliers.

Current information systems satisfy supply chain communication requirements.

Frequent and regular communication occurs among supply chain members.

There exists a willingness among supply chain members to share information.

There is the use of cross-functional teams in our organisation

Our organisation shares its technical expertise with its key partners.

Stakeholder trust

People who represent our partner organisations are reliable.

Our partners have capabilities in their field operations.

Our partners can build relationships.

Our partners understand the needs of the service area.

Our partners do not violate our agreements and laws.

Our partners have a good reputation in the industry.

Our organisation can count on each partner to meet its obligations.

Our organisation should continue to cooperate with partner organisations.

Governance and administration

As a representative of our organisation, I understand our roles and responsibilities.

Our organisation develops solutions to collaboration problems jointly with other partners.

During the meetings with our partners, we achieved what was proposed

The objectives of collaboration are agreed upon in cooperation with partners

Our organisation tasks are highly coordinated with the functions of the partner organisations

Stakeholder relationship continuity

Our organisation expects its relationship with key partners to last a long time.

The key partners see our relationship as a long-term alliance.

We view our key partners as an extension of our organisation.

We provide financial support to key partners.

We work with key partners to improve their quality in the long run.

Our key partners have devoted time and money to developing our business relationship.

We feel a high level of commitment to this business relationship.

Stakeholder collaboration fluency

Facilitative routines have been created for our collaborative activities.

Problems are easy to solve through collaboration

The partnership efficiently uses all parties' knowledge

The partnership has the needed resources and capabilities for successful operation.

The collaboration is well organised.

The partnership takes future challenges into account

The goal of cooperation is clearly defined

Supply chain performance

Our supply chain can handle nonstandard orders.

Our supply chain can meet special customer/client specification requirements.

Our supply chain can produce a variety of services and products to meet the requirements of our customers/clients.

Our supply chain can rapidly introduce numerous service/product improvements/variations.

Our supply chain can handle the rapid introduction of new services/products.

Our supply chain has a fast customer response time.

Our supply chain is characterised by a great amount of cross-over of the activities of our organisation and our trading partners.

Our supply chain is characterised by a high level of integration of information systems in our organisation.